IN THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF NEW JERSEY

JUAN DUARTE, BETSY DUARTE and N.D., Infant, by Parents and Natural Guardians JUAN DUARTE and BETSY DUARTE, LEROY NOBLES and BETTY NOBLES, on Behalf of Themselves and all Others Similarly Situated, Plaintiffs, vs. UNITED STATES METALS REFINING COMPANY; FREEPORT MINERALS CORPORATION; and AMAX REALTY DEVELOPMENT, INC., Defendants.	Civil Action No. 2:17-cv-01624-ES-SCM Honorable Esther Salas Honorable Steven C. Mannion **Hearing Date: November 18 2019** **Defendants' Memorandum In Support of The Motion to Exclude the Opinions of Plaintiffs' Expert David A. Sullivan**

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MEMORANDUM IN SUPPORT OF DEFENDANTS' MOTION TO EXCLUDE THE OPINIONS OF PLAINTIFFS' EXPERT, DAVID A. SULLIVAN

Defendants United States Metals Refining Company ("USMR"), Freeport Minerals Corporation ("FMC"), and Amax Realty Development, Inc. ("ARDI") (collectively "Defendants") respectfully submit this Memorandum in Support of the Motion to Exclude the Opinions of Plaintiffs' Expert, David A. Sullivan, and would respectfully show the Court as follows:

I. INTRODUCTION

Plaintiffs seek to certify a class of residential property owners in Carteret, New Jersey.[1] Plaintiffs' expert David Sullivan is an air modeler who attempted (and failed, as discussed below) to use a model-based evaluation as the method underlying his opinion that there is lead in soils throughout and beyond the proposed class area. Plaintiffs' claims are entirely based on alleged soil contamination, and Sullivan is the Plaintiffs' sole expert who attempts to connect historic smelter air emissions from 50 years or more ago to current soil conditions at the proposed class properties.

Sullivan's original opinion was that air modeling could demonstrate the magnitude of soil concentrations attributable to the USMR smelter. Unfortunately for Sullivan, however, that model contained a major error, which he confessed during his first deposition in this case.[2] Sullivan revised and corrected his model, resubmitting it three weeks later. This new, corrected model showed much less impact from USMR, with the revised model results showing that the potentially discernable impacts to soil from USMR's air emissions were limited to a small area in the

[1] *See* Amended Complaint ¶ 53, ECF No. 51.
[2] Dep. of David A. Sullivan's, June 11, 2019 ("Sullivan 1 Tr.") at 9:23–12:19 (attached at Exhibit A).

immediate vicinity of the smelter, with negligible impacts in the vast majority of the proposed class area.[3]

Remarkably, when the results from his chosen method no longer supported his opinions, he did not change his conclusions to match the new model. Rather, Sullivan seeks to defend the same conclusion even though his model results no longer support it. Sullivan's opinion is unreliable *ipse dixit*.

Sullivan also criticizes remedial actions that are conducted consistent with New Jersey regulatory requirements and common practices even though Sullivan acknowledges that he has no prior experience with New Jersey remediation regulations or doing remediation work.[4] Sullivan's conclusions on the remediation standards should be excluded because he has no expertise in the relevant subject matter for those opinions.

Defendants ask the Court to exclude Sullivan's opinions because they do not meet the standards for admissibility.

II. FACTUAL BACKGROUND

The Duarte case is a putative class action asserting property damage from a copper smelter that USMR operated in Carteret, New Jersey from 1906 to 1986. Plaintiffs allege that air emissions from the smelter landed and remain on their properties.[5] USMR's ongoing off-site investigation resulted in the designation of an Area-of-Concern ("AOC") with 300 properties in close proximity to the smelter.[6] The extensive soil sampling in and beyond[7] the AOC demonstrates that any off-

[3] Amended Expert Report of David A. Sullivan, June 28, 2019 ("Sullivan June 28 Report") at 49, Figure 16c (modeled concentration isopleths include the 62 ppm lead background used by Sullivan) (attached at Exhibit 6 at p. 49), see also Exhibit E; Dep. of David A. Sullivan, July 9, 2019 ("Sullivan 2 Tr.") at 288:17–289:3 (attached at Exhibit B).
[4] Sullivan 1 Tr. at 28:9–30:5 (Exhibit A).
[5] *See* Amended Complaint ¶ 21, ECF No. 51.
[6] Expert Report of Lisa Szegedi, June 28, 2019 ("Szegedi Report") at 3 (attached at Exhibit 16).
[7] There is testing along three transects beyond the AOC (*see* attached Exhibit C).

site impacts from the smelter that are distinguishable from naturally occurring background or other anthropogenic sources end within the AOC. The relative locations of the smelter site, AOC, transect area, and class area are depicted on Exhibit C.

The contaminants at issue in the claims are lead, arsenic, and copper. There are numerous other contributors to lead, arsenic, and copper in the proposed class area. Those contributions vary from property to property and require individualized evaluations to determine the property specific origin of the contaminants.

III. LEGAL STANDARD

Federal Rule of Evidence 702 ("Rule 702"), as well as the standards set forth in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*,[8] govern the admissibility of expert testimony. Plaintiffs have the burden of demonstrating Sullivan's purportedly expert opinions offered in support of class certification meets these "rigorous" standards.[9]

Under Rule 702, a qualified expert may offer an opinion if four requirements are met: "(a) the expert's scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue; (b) the testimony is based on sufficient facts or data; (c) the testimony is the product of reliable principles and methods; and (d) the expert has reliably applied the principles and methods to the facts of the case." The Third Circuit views Rule 702 as a "trilogy of restrictions on expert testimony: qualification, reliability, and fit."[10] First, the witness must be qualified to testify as an expert, meaning the witness possesses

[8] 509 U.S. 579 (1993).
[9] *In re Blood Reagents Antitrust Litig.*, 783 F.3d 183, 187 (3d Cir. 2015) ("[A] plaintiff cannot rely on challenged expert testimony, when critical to class certification, to demonstrate conformity with Rule 23 unless the plaintiff also demonstrates, and the trial court finds, that the expert testimony satisfies the standard set out in *Daubert*.").
[10] *Calhoun v. Yamaha Motor Corp., U.S.A.*, 350 F.3d 316, 321 (3d Cir. 2003) (internal quotation marks omitted).

"specialized expertise."[11] Second, the testimony must be reliable, "based on the methods and procedures of science rather than on subjective belief or unsupported speculation," and "the expert must have good grounds for his or her belief."[12] Third, the testimony "must 'fit,' meaning the expert's testimony must be relevant for the purposes of the case and must assist the trier of fact."[13] In applying these standards, the Court acts as a gatekeeper for expert testimony, guarding against consideration of testimony that fails to meet minimum standards for helpfulness and dependability.[14]

IV. ARGUMENT

A. Sullivan abandoned his air model but maintains the same opinions without adjusting his methodology.

Sullivan's method is to use an air model that uses estimates of historic smelter air emissions and area meteorology to predict the concentration of lead that settled from the air into the soil in the class area.[15] Sullivan confessed a major error in his model during his first deposition—the crux of which is that he overestimated emissions by a factor of 8.[16] When he corrected the model inputs, the results no longer supported his opinions. Undeterred, Sullivan presents the same opinions on the same methodology even though his model results are vastly different. Sullivan's opinions do not flow reliably from the method he used which renders them inadmissible.[17]

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[11] *Id.*
[12] *Id.* (internal quotation marks omitted).
[13] *Id.*
[14] *See In re Zoloft (Sertraline Hydrochloride) Prod. Liab. Litig.*, 858 F.3d 787, 792 (3d Cir. 2017).
[15] Expert Report of David A. Sullivan, May 4, 2019 ("Sullivan May 4 Report") at 29 ("6.0 BASIS FOR OPINIONS (MODEL BASED EVALUATION)") (attached at Exhibit D).
[16] Sullivan Tr. 1 at 12:17–19 (Exhibit A).
[17] *Heller v. Shaw Indus., Inc.*, 167 F.3d 146, 153 (3d Cir. 1999) (A court "must examine the experts conclusions in order to determine whether they could reliably follow from the facts known to the expert and the methodology used.").

1. Sullivan admits his first model was wrong.

Sullivan's initial May 4, 2019 report, presented an air model of emissions from the USMR smelter that predicts surface lead concentrations based on the entire operating life of the smelter. Sullivan then purported to "confirm" the results of that model by plotting the air model results and averages of soil sample results on the same aerial photograph of the proposed class area.[18] Sullivan concluded that his first air model "reasonably replicates the general trends and magnitudes of the measured soil contamination;"[19] thus, purporting to create a link between estimated historic air emissions and present day soil concentrations. Sullivan's figure with the model output is attached as Exhibit E.

Sullivan admitted a major error with the model inputs in his first deposition on June 11.[20] Sullivan issued an amended report three weeks later with a corrected air model.

2. Sullivan's corrected air model does not support his opinions.

In his amended June 28 report which presents his corrected air model, Sullivan attempts to reach the same opinion even though his amended model results no longer support his conclusion. His current model predicts that lead impacts from the USMR smelter *do not* extend to the edge of the class area and that the impacts are confined to the smelter site and AOC.[21] The revised model output is attached as Exhibit F. Specifically, review of Sullivan's Figures 15, 16a, 16b, 16c, and 17 show that under every scenario that Sullivan considered, his maximum predicted soil concentration (including both smelter emissions and background) is less than half the lead cleanup

[18] Sullivan May 4 Report at 46 ("6.6 Model Performance Evaluation: Soils Data") (Exhibit D).
[19] *Id.* at 11, Opinion 11 (emphasis added).
[20] One input in Sullivan's model is emissions rate. The initial report used emissions rates that were *eight times* the actual emissions rates at the USMR smelter. Sullivan corrected this error in his amended report. *See* Sullivan 1 Tr. at 12:7-19 (Exhibit A).
[21] *See* Sullivan June 28 Report at 46, Figure 15 (Exhibit 6).

level of 400 ppm outside the immediate smelter area (e.g., the AOC). Sullivan's amended report still refers to the air model as the basis for his opinion and the soil sample data as confirmatory.[22]

Even though he did not change his method, Sullivan now says that the model cannot predict soil concentrations; it is only sufficient to predict that soil lead concentrations decline as you move away from the smelter.[23] Sullivan flip-flops without explanation on the sufficiency of the data available for air modeling, and abandons the model as a basis to identify the area where soil concentrations have been measurably impacted by smelter emissions.

Sullivan seeks to skip the air model part of his original method. Rather than just using the soil sample data as confirmation, he now relies on a visual interpretation of average soil sample data to conclude that there is smelter contamination throughout the proposed class area. The entire substance of Sullivan's analysis of the soil data is:

> What is observed, however, is that the general pattern and decrease of modeled soil concentration with distance from USMR are reasonably consistent with the measured soil contamination data. The observed soil contamination in Carteret, NJ was dominated by airborne deposition impacts of heavy metals . . . (Ref 58:1).[24]

Sullivan uses the exact same language to describe his soil data analysis in both his May 4 and June 28 reports.[25]

This opinion is completely result-oriented. If Sullivan likes the results, as he did in his original report, he opines that the data is sufficient and that the model can predict contaminant concentrations in the proposed class area. If Sullivan does not like the results, as he does in his amended report, he opines that the data is not sufficient and that the model cannot predict contaminant concentrations in the class area.

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[22] *Id.* at 32 ("6.0 BASIS FOR OPINIONS (MODEL BASED EVALUATION)").
[23] Sullivan 2 Tr. at 263:12-25 (Exhibit B).
[24] Sullivan May 4 Report at 46 (Sullivan's reference "Ref 58:1" is to a map showing the class area.) (Exhibit D).
[25] Sullivan June 28 Report at 51 (Exhibit 6).

To be clear—the amount of data available did not change. The only difference between Sullivan's original report and amended report is the correction of his error. Sullivan's rejection of his original opinion is, in essence, Sullivan stating that "the results are not what I wanted, so my data must be bad." Sullivan abandoned his air model method without offering a replacement method. Thus, his opinion should be excluded as unreliable.

3. Sullivan cannot predict lead levels in the class area.

Sullivan's current opinion is that his model cannot predict lead concentrations in the class area and he has not determined the lead concentration at any point in the class area other than where a sample has been collected.

> Q: Okay. The magnitudes of lead contamination at any particular location in the class area cannot be predicted by the model based on the data you currently have?
>
> A: That's a fair statement.[26]

Sullivan's air model was the basis for his opinions. Sullivan now rejects the foundation for his air model. He provides no method for drawing a class area, and does not quantify the magnitude of any impacts. "[A]n expert opinion must be based on reliable methodology and must reliably flow from that methodology and the facts at issue."[27] Thus, his opinion that the class area and beyond were affected should be excluded as unreliable because it has no basis.

B. Sullivan's reliance on visual observation of lead sample results is unreliable and should be excluded.

Disappointed with the corrected air model results, Sullivan tries to rely on his supposedly "confirmatory" soil data as the basis for his opinion. He simply looks at the patterns in the lead sample result averages as plotted on a photo of the class area.[28] In these Rorschach blots, Sullivan

[26] Sullivan 2 Tr. at 265:17-21 (Exhibit B).
[27] *Heller*, 167 F.3d at 152.
[28] Sullivan 2 Tr. at 307:11-21 (Exhibit B).

claims to see a pattern of decreasing lead concentration as you move further away from the smelter smoke stack.[29] Sullivan looks only at lead patterns and does not compare patterns for arsenic or copper.[30] He summarily dismisses the contribution of non-smelter sources.[31]

1. Sullivan uses no scientific method to identify a pattern of declining concentrations of lead with distance from the smelter.

Sullivan claims that the lead sample results show a decline pattern with distance from the smelter.[32] Sullivan identified this purported pattern solely through visual estimation and did no statistical analysis.

> Q: Okay. Aside from the qualitative visual observation of the pattern, did you use any other methods -- methods or tools to evaluate the patterns of the soil data to support your opinions regarding the concentration of lead throughout the class area?
>
> A: My -- my observation of the iso lines relative to my observation of the -- of the soil trends was done visually. It was not based upon statistical analysis.[33]

He labels this analysis as "confirmatory modeling," yet the maps he prepared to visualize this analysis show no evidence of confirmation.[34] Rather, Sullivan's maps demonstrate that the decline happens very close to the smelter and most of the class area is unaffected by deposition from the USMR smelter.[35]

While experts commonly extrapolate data, an expert's opinion is not admissible if the expert's evidence and opinion are only connected based on the *ipse dixit* or "say so" of the expert.[36] Here, there "is simply too great an analytical gap between the data and opinion proffered," and

[29] *Id*. at 266:3–267:15.
[30] Sullivan June 28 Report at 42–50 (Exhibit 6).
[31] Sullivan 2 Tr. at 313:8–314:3 (Exhibit B).
[32] *Id*. at 266:3–267:15.
[33] *Id.* at 307:11-21.
[34] Sullivan 1 Tr. at 13:24–14:4 (Exhibit A).
[35] Sullivan June 28 Report at 49, Figure 16c (Exhibit 6).
[36] *General Elec. Co. v. Joiner*, 522 U.S. 136, 146 (1997).

Sullivan's opinion that there is a decline pattern with distance from the smelter should be excluded.[37]

Sullivan stated that he expected to see a declining trend in colors as the dots move away from the smelter.[38] Sullivan attempts to create a visual representation of this theory by comparing his predicted lead concentrations to measured lead concentrations in the AOC in Figure 16a of his report. Sullivan represents his modeled lead concentrations as "iso lines" and measured lead concentrations as colored dots. Figure 16a, in which Sullivan claims to see a declining trend in colors with distance from the smelter, is reproduced below as Figure 1.[39] The colors should appear with the colors for the highest concentrations closest to the smelter and the colors for lesser concentrations following in order. Sullivan concludes that his iso lines are consistent with the soil data based on a visual inspection of this figure.

[37] *Id.*

[38] Sullivan 2 Tr. at 318:11–319:17 (Exhibit B). ("Q: Okay. And it's your testimony that we can look at Exhibit 566 and the color dots there moving away from the smelter and conclude that that it is a declining trend in -- in colors, right? MR. NIDEL: Objection to form. THE WITNESS. Looking at the overall -- the total plot, yes, it's a generally decreasing trend with distance from the smelter. Again, with the -- with the expected scatter around that general trend. BY MR. WILKINSON: Q: And just to be clear, what we would be talking about is a declining trend. As you move away from the smelter, what you would expect is on using the color codes that -- that you've used for lead ranges, that the purple dots would be closest, the red dots would be next closest, and then you would get to the orange dots, and then as you moved away, you would get to the dark blue dots, and then further away, you would get to the light blue dots, and even further away, you would get to the green dots. Right? A: In a general sense, yes. Q: Okay. And that's the pattern that, in your opinion, we see in Exhibit 566 or, if you prefer, going back to Figure 16a from your report? A: That -- that's correct.")

[39] Sullivan June 28 Report at 47, Figure 16a (Exhibit 6).

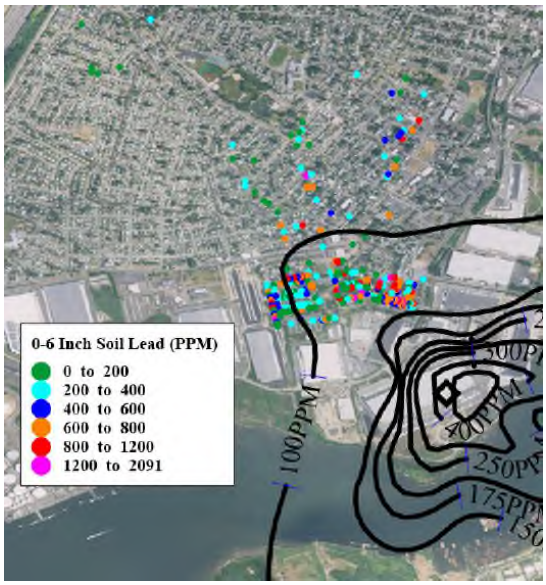

Figure 1: Figure 16a from Sullivan's June 28 Amended Expert Report, and also exhibit 566 in this case.

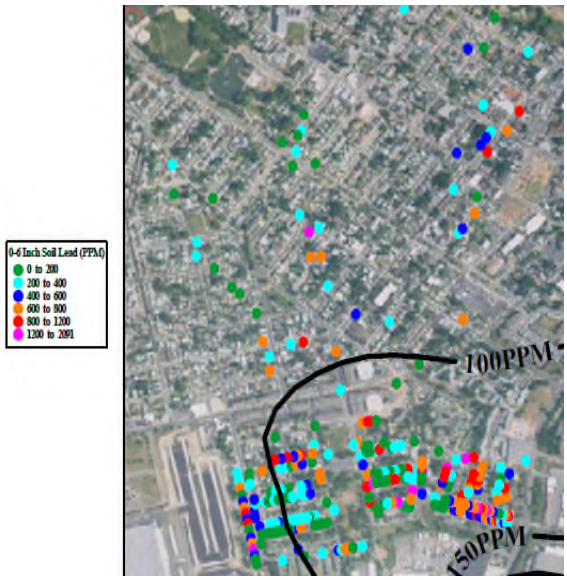

Figure 2: Figure 6 from Ranjit J. Machado's July 29 Expert Report. It is a zoomed-in version of Figure 16a from Sullivan's Expert Report.

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Figure 2 is an enlarged version of a part of Figure 16a.[40] It is evident that there is no declining trend in color or correlation between Sullivan's predicted pattern of lead concentrations, and the measured lead concentrations there are green, aqua blue, dark blue, orange, red, and purple dots across much of the area sampled. Sullivan attempted no further statistical analysis of this data to determine that there was a pattern or declining trend in lead concentration.[41]

2. Plotting the lead data demonstrates the lack of pattern in the data.

When plotted, the soil data Sullivan relies on shows no observable correlation between the measured lead concentration and Sullivan's predicted deposition pattern.

[40] Expert Report of Ranjit J. Machado, July 29, 2019 ("Machado Report") at Figure 6 (Exhibit 11).
[41] Sullivan 2 Tr. 306:23–307:21 (Exhibit B).

Below are two figures created using statistical and graphical methods to compare actual and predicted concentration.[42] These methods rely on trends to validate model predictions and understand that there will be scatter in the data.[43]

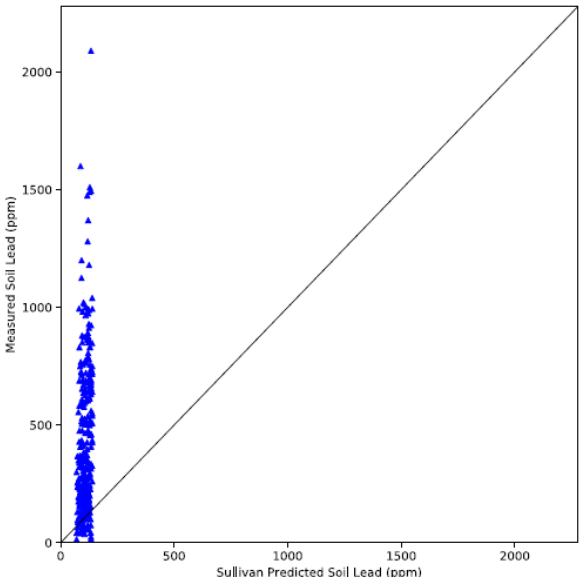

Figure 3: Machado Expert Report Figure 7

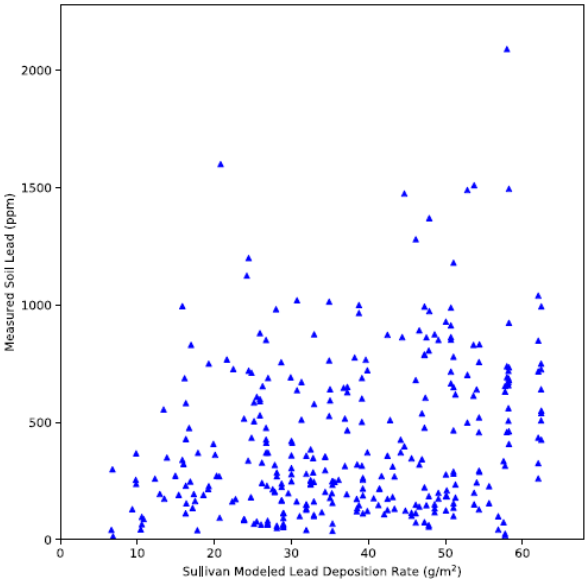

Figure 4: Machado Expert Report Figure 8

Figure 3 is a scatter plot comparing Sullivan's predicted lead concentrations to measured lead concentrations. Each point represents measured lead concentrations. The diagonal line represents Sullivan's predicted deposition pattern. If the measured lead concentrations correlated with Sullivan's prediction, they would fall along the diagonal line in Figure 3. It is apparent that the measured lead concentrations do not show an observable correlation with Sullivan's prediction.

Figure 4 is a plot of Sullivan's modeled lead deposition rate compared to measured lead concentrations. It is evident from this plot that measured lead concentrations do not increase consistently as with Sullivan's predicted lead deposition rates, rather, they appear scattered and create no pattern.

[42] Machado Report at 38, and Figures 7 and 8 (Exhibit 11).
[43] *Id.*; Figures 3 (Machado Report Figure 7) and 4 (Machado Report Figure 8) were created using Sullivan's soil data file.

Sullivan did not take such basic steps as to compare the results of his model to his data plot to check his visual observation. These plots make it clear that measured lead levels do not reflect the trend across the class area that Sullivan predicts. Moreover, there are numerous statistical methodologies that can be used to test whether data trends match an expected exponential trend from air deposition. Defendants' expert, Dr. Rouhani, looked at several of these including trend analysis, background analysis, and variograms.[44] Given these statistical tools, it is not enough for Sullivan to say "because I say I can see it, it must be so." Thus, Sullivan's opinion that his visual observation of the soil data supports his conclusion should be excluded as it has no basis.

3. Sullivan fails to properly account for alternate sources that would explain the data patterns.

Sullivan's opinion that the measured contamination is solely due to the smelter is also unreliable because he fundamentally asks the wrong question about other sources. Sullivan predicates this opinion on the notion that alternative sources are only relevant if individually an alternative source explains ALL of the lead, arsenic, and copper in the class area. Sullivan provides no analysis of how other sources do not produce the highly variable pattern of data in the AOC and transect areas. Courts examine several factors—including whether the expert accounts for alternative explanations—when determining the reliability of an expert's testimony.[45]

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[44] *See* Expert Report of Shahrokh Rouhani, July 1, 2019 ("Rouhani Report") at 12-21 (trend analysis), 13-16 (background analysis), 22-25 (variograms) (attached at Exhibit 14).

[45] Factors include: "(1) whether a method consists of a testable hypothesis; (2) whether the method has been subject to peer review; (3) the known or potential rate of error; (4) the existence and maintenance of standards controlling the technique's operation; (5) whether the method is generally accepted; (6) the relationship of the technique to methods which have been established to be reliable; (7) the qualifications of the expert witness testifying based on the methodology; and (8) the non-judicial uses to which the method has been put." *In re Paoli R.R. Yard PCB Litigation*, 35 F.3d 717, 742 n.8; *see also Magistrini v. One Hour Martinizing Dry Cleaning*, 180 F. Supp. 2d 584, 594-95 (D.N.J. 2002); *see also Joiner*, 522 U.S. at 146.

Sullivan purports to exclude other sources of contamination in the class area by simply asserting, without analysis, that they cannot produce the pattern Sullivan sees in the data because they are either too small or do not fit a decline pattern.[46] Other sources in the area may not create a decline pattern, but they do account for the randomness and magnitude of the data. Sullivan does not account for alternative explanations so his opinion should be excluded.

Even Sullivan acknowledges that there are several complicating factors that can affect a deposition pattern.[47] Yet he has not investigated these other factors to explain how they may affect the soil data. Sullivan dismisses agricultural sources because they do not contribute enough arsenic and lead to account for ALL of the lead and arsenic in soil samples.[48]

Shockingly, Sullivan dismisses slag sources because there is too much variability in the data for "an in-depth analysis of the contribution from this source category."[49] Instead, he does a "broader review"[50] to conclude that ONE source of slag does not account for the overall soil sample pattern that he sees. Moreover, Sullivan ignores the extensive soil core boring and property excavation information which demonstrates the presence of slag throughout the AOC. He also does not address other fill material that is ubiquitous in the AOC.

Finally, Sullivan summarily dismisses the contribution of lead-based paint in an *ipse dixit* statement. Without citation, Sullivan asserts that there is not sufficient leaded paint to account for the entire magnitude and pattern of soil contamination.[51] Sullivan did no analysis in this case of the contribution of leaded paint in the class area nor did he quantify the total amount of lead on

[46] Sullivan June 28 Report at 52 (Exhibit 6).
[47] Sullivan 2 Tr. at 315:3-316:4 (Exhibit B).
[48] Sullivan June 28 Report at 56 (Exhibit 6).
[49] *Id*.
[50] *Id*.
[51] *Id*. at 57.

any particular property from all properties that might be used as a point of comparison. An evaluation of representative homes in the transect area demonstrates that the lead in the soil can be accounted for by the use of lead-based paint.[52]

C. Sullivan's ratio analysis is unreliable for multiple independent reasons.

Separate from his other work,[53] Sullivan plots ratios of metals in soil sample results and compares those to ratios of metals from "background" samples.[54] Sullivan uses the ratios to incorrectly conclude that the sample result ratios return to background ratios approximately 1.5 miles from the smelter stack. Sullivan asserts that the pattern in the ratios "is indicative of impacts from the USMR smelter . . . ."[55] Sullivan acknowledges that his ratio analysis does include non-smelter sources, yet he has not even attempted to evaluate or isolate those other contributions.[56]

Sullivan's ratio method, analysis, and conclusions are expressed in a total of four sentences and three figures in his report. This scant analysis is fatally flawed for three independent reasons: (1) it relies on inaccurate and insufficient background numbers; (2) Sullivan creates non-representative soil sample ratios by calculating a single ratio by mixing results from multiple samples rather than using the results for three metals from any single sample; and (3) Sullivan ignores the adverse effects of high-leverage data from parcels north of Roosevelt Avenue.

1. Flawed background comparison

Sullivan's flawed method of calculating a background ratio renders his ratio opinions unreliable. Sullivan calculates his background ratio based on only two samples.[57] Calculating a

[52] Expert Report of William L. Hall, July 5, 2019 at 56 (attached at Exhibit 10).
[53] Sullivan 2 Tr. at 309:16–310:3 (Exhibit B).
[54] Sullivan's current ratios are presented in his supplemental report dated June 7, 2019 ("Sullivan June 7 Report") (attached at Exhibit G). Figures 10 and 10a on page 8 of the report are helpful illustrations of the analysis described in this section.
[55] Sullivan June 28 Report at 13, Opinion 13 (Exhibit 6).
[56] Sullivan 1 Tr. at 178:20–180:4 (Exhibit A).
[57] Rouhani Report at 30 ¶ 63 (Exhibit 14).

critical limit based on only two samples flies in the face of common statistical practices.[58] Sullivan acknowledges that background is not one constant number and varies as a distribution of background[59] but ignores this variability in his analysis.

Sullivan picked his two "background" samples from a 1993 NJDEP study of background numbers across New Jersey. New Jersey conducted a 1997 background study that was more representative of the Carteret area and contained more data. Sullivan did not know whether New Jersey had done any studies other than the 1993 report.[60] Using background data from the 1997 study produces vastly different ratios than those used by Sullivan in his analysis.[61]

The significant difference in background values obtained from a broader set of data demonstrates the error in Sullivan's methodology of selecting only two samples from the wrong study.

2. Flawed data selection for soil sample ratios

Sullivan determined Carteret soil sample ratios by selecting the median (or average) for each metal on each property and then calculating a ratio of the averages rather than calculating a ratio for the metals in each individual sample and then determining the median by averaging those individual ratios.[62] These two approaches yield different results, and only the later approach is mathematically correct. Sullivan's approach results in ratios that are not representative of any actual sample. Use of the median eliminates all of the high and low values. The effect of eliminating the high and low values cannot be determined without determining sample-specific ratios. Sullivan's approach is based on flawed statistics.[63]

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[58] *Id.*
[59] Sullivan 1 Tr. at 207:4–15 (Exhibit A).
[60] Sullivan 2 Tr. at 331:14–19 (Exhibit B).
[61] Rouhani Report at 30 ¶ 63 (Exhibit 14).
[62] *Id.* at 30 ¶ 61.
[63] *Id.*

3. Statistical analysis ignores the effect of leveraged data

Sullivan conducts a statistical analysis to determine a line that fits the sample ratio data to use for his comparison to his flawed background ratios.[64] This statistical analysis for the soil samples is just as flawed as Sullivan's background analysis because he groups all of the data together rather than recognizing that there are two different data sets that must be evaluated separately. There is far more data in the AOC than there is in the transect area that is further from the smelter. When the data from the AOC and data from the transect area are analyzed as one data set instead of two separate data sets, the significant difference in the number of data points in each set skews the analysis. This statistical issue is referred to as leverage. Here, the relatively small number of data points that are further from the smelter has a disproportionate impact on the slope of the line that Sullivan draws through the data. Data from parcels north of Roosevelt Avenue are high-leverage and influential observations.[65] The vast majority of existing sampling locations are concentrated within the AOC. Far fewer samples have been taken north of Roosevelt Avenue and within the Site.

Generally accepted statistical methods would apply a separate statistical analysis to each of the two data sets individually. Sullivan knew that leveraged data could affect the results but did no analysis to determine these effects.

> Q: In the field of statistics, what is a high leverage point?
>
> A: In regression, a high leverage point would be a data point that would tend to have a substantial influence on that regression line.
>
> Q: Were there any high leverage points in your analysis of ratios?

[64] Sullivan June 7 Report at 7-9, Figures 9-11 (Exhibit G).
[65] A "high-leverage observation" is an observation made far away from other measurements, while an "influential observation" is one whose deletion has a large effect on the regression parameter estimates.

> . . .
>
> THE WITNESS: There were a lot of points in those ratios. I mean, hundreds of -- hundreds of data points.
>
> We didn't do an assessment of leverage -- of leverage. We -- we did a simple analysis that took all the data that wasn't outliers and we -- we took the median points and we showed as a function of distance what those ratios were relative to background.[66]

Sullivan's failure to consider the adverse effects of high-leverage data from parcels north of Roosevelt Avenue and flawed method of calculating a background ratio renders his ratio regression analysis unreliable and misleading. Thus, his analysis should be excluded.

D. Sullivan is not qualified to render opinions regarding "hotspots."

USMR is remediating properties in the AOC pursuant to New Jersey regulatory requirements and guidance, which allow remediators to determine compliance with applicable soil remediation standards using compliance averaging.[67] The New Jersey Department of Environmental Protection ("NJDEP") requires that each property be divided into one or more functional areas, each less than 0.25 acres in size.[68] Multiple samples are collected and analyzed from each functional area.[69] These samples are then used in the compliance averaging calculation to evaluate the functional area as a whole, rather than on a point-by-point basis. If the compliance average concentration for a functional area as a whole is below the soil remediation standard, then it is protective of human health and the area need not be excavated.[70] Similar methods are used by the U.S. Environmental Protection Agency and numerous other states.[71]

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[66] Sullivan 2 Tr. at 328:16–329:24 (Exhibit B).
[67] Szegedi Report at 20-21 (Exhibit 16).
[68] *Id*.
[69] *Id*.
[70] Dep. of Lisa Szegedi, Aug. 14, 2019 ("Szegedi 2 Tr.") at 237:22-25 (attached at Exhibit H).
[71] Arizona, Connecticut, Florida, Georgia, Illinois, Oregon, Pennsylvania, Washington, and Wisconsin all allow methods similar to compliance averaging. Szegedi Report at 21 (Exhibit 16). Composite sampling, a method that uses averages to determine compliance of an entire functional

Plaintiffs have chosen to refer to any of the individual samples that exceed the remediation standard as a "hotspot" even though the regulations clearly provide for the use of compliance averaging and compliance is based on the compliance average rather than individual points.

Sullivan concedes that he is not familiar with the New Jersey remedial regulations, has never used the regulations before, and has never done a remediation project.[72] His allegation that USMR's cleanup leaves behind hotspots is unfounded, and he concedes that compliance averaging is allowed by the New Jersey regulations.[73] Sullivan is an air modeler and characterizing alleged "hotspots" is not within his expertise. Sullivan thus is not qualified to render opinions on compliance with the NJDEP remediation regulations, as he has no experience with New Jersey's soil remediation regulations or soil remediation generally.

E. Sullivan's opinions on outliers are not helpful to the fact finder.

Outliers are sample results that are statistically not part of the same data set as sample results from the target data set. New Jersey remediation regulations allow removal of outliers from the data set used for remediation decisions.[74] Since the beginning of the remediation process, boring logs, evidence on the ground, and documentation in working papers has consistently indicated that historic fill[75] and other non-smelter-related contamination are present in soil samples

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area, is allowed by the U.S. Environmental Protection Agency, Hawaii, Michigan, Montana, and Washington. *Id.*; *see also* Sullivan 1 Tr. at 198:20-23 and 197:16-21 (Exhibit A) (explaining that composite sampling allows remediators to mix samples prior to analysis and determine compliance based on the result of the mixed sample, while compliance averaging requires remediators to analyze individual samples and then average the results to determine compliance).

[72] Sullivan 1 Tr. at 28:9–30:5 (Exhibit A).

[73] *Id*. at 198:15-18.

[74] Szegedi Report at 15 (Exhibit 16).

[75] Historic fill is non-native material that was contaminated prior to emplacement and is used to raise the topographic grade of a property. Historic fill commonly consists of incinerator residue, demolition debris, fly ash, waste materials, brick, concrete, fabric, and other man-made materials. *Id.* at 7.

in the AOC.[76] Remediation is ongoing and data supporting the removal of outliers is reflected in remediation documentation and will be compiled in USMR's final site remedial action report at the end of the remediation process.[77]

Sullivan agrees with removal of outliers but claims that USMR has not documented the reasons particular results are outliers.[78] Sullivan has no experience working with the New Jersey soil remediation regulations or any other state's soil remediation standards[79]—this alone renders him unqualified to opine on USMR's compliance with New Jersey state regulations.

Expert testimony must also be relevant and helpful to the fact finder.[80] Sullivan does not actually disagree with USMR's use of outliers, and USMR has documented the basis for excluding outliers as Sullivan says it should. Thus, his opinion should also be excluded because it is not relevant or helpful and because Sullivan is unqualified to opine on compliance with New Jersey regulations related to "outliers."

V. CONCLUSION

Defendants respectfully request that the Court grant this Motion and exclude the expert reports and testimony of David A. Sullivan as inadmissible in this matter.

Dated: October 25, 2019

[76] Szegedi 2 Tr. at 294:17-297:5 (Exhibit H); *Id.* at 294:17-25 ("As I had indicated before, we had numerous indications, from the minute we started seeing the data come in, that we had evidence of the historic fill within the AOC"). The presence of historic fill throughout the AOC is apparent when conducting excavations. Szegedi has stated that "visually, the colors are starkly different" and "if we look at the boring logs, the boring logs found brick, concrete, wood, coal, glass, cinders, debris, ash, metal, and plastic in the material we're identifying as historic fill." *Id.* at 395:2-9.
[77] *Id.* at 212:15–213:19.
[78] Sullivan May 4 Report at 10-11 (Exhibit D).
[79] Sullivan 1 Tr. at 28:9–30:5 (Exhibit A).
[80] *United States v. Schiff*, 602 F.3d 152, 172-73 (3d Cir. 2010).

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